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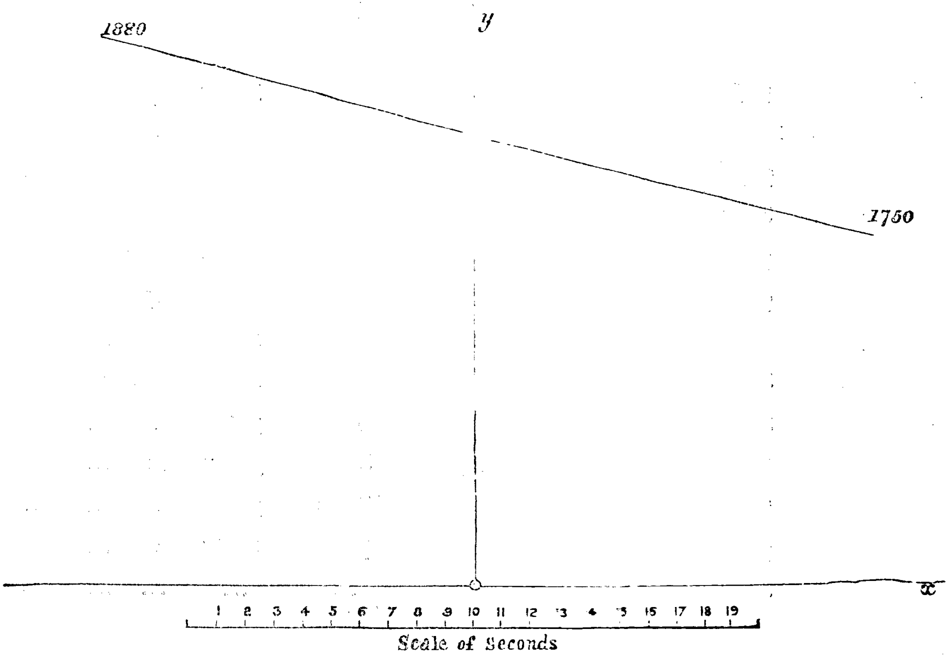
been described. The star ought to be measured repeatedly with great care, and with the best instruments, for some years to come, and then the question of its motion may be advantageously re-discussed.

A diagram is annexed to show the path that has been at present described.



Temple Observatory, Rugby,
1875, *March.*

Observations of the Satellites of Saturn made in 1874 *at the Washington Observatory.*

(*Communicated by the Director of the Observatory.*)

In the column "No." the figure denotes either the number of independent measures of position-angle, or the number of measures of double distance. In the column "wt." the number denotes the goodness of the images on a scale from 5 = perfect to 1 = very bad. In the column "Obser." N denotes Newcomb and H Holden.

The value of 1 revolution of the micrometer-screw is $9''\cdot9482 \pm 0''\cdot0049$.

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Mimas.

1874.	Wash. M.T. h	m	Pos. Ang. °	No.	Wt.	Wash. M.T. h	m	Pos. Ang. °	No.	Wt.	Obser.
Sept. 2	9	53	274·7	2	2	10	12	2·856	2	2	N
26	10	12	92·9	4	2	10	1	2·700	3	2	„
Oct. 15	7	8	94·8	2	2	7	17	2·714	1	2	„
Enceladus.											
Aug. 29	9	56	268·3	3	...	10	35	3·346	2	...	N
31	10	23	85·1	3	...	10	31	2·982	2	...	„
Sept. 2	9	58	252·4	2	...	10	5	2·304	2	...	„
22	8	54	86·6	3	...	9	30	3·209	2	...	„
23	7	59	291·0	3	...	8	32	2·640	2	...	„
24	9	16	260·3	3	...	10	4	2·981	2	...	„
25	7	56	105·5	3	...	8	54	2·980	2	...	„
26	8	4	55·4	3	3	8	44	1·825	2	3	„
Oct. 1	8	25	272·8	3	...	9	23	3·502	1	...	„
3	7	23	82·5	2	...	8	30	3·142	2	...	„
14	7	37	89·3	2	...	8	22	3·193	2	...	„
15	7	26	300·2	2	...	7	48	2·087	2	...	„
17	8	12	115·7	2	1	...		...	...	...	H
Tethys.											
Aug. 29	9	50	299·0	2	...	10	27	2·561	2	...	N
31	9	28	320·1	3	...	10	8	1·663	2	...	„
Sept. 2	9	13	13·5	2	...	9	47	1·377	2	...	„
3	8	42	213·8	2	...	9	19	1·639	2	...	„
22	8	33	221·6	3	...	9	8	2·773	2	...	„
23	8	19	77·9	3	...	9	0	3·230	3	...	„
24	9	4	266·6	3	...	9	43	3·959	2	...	„
25	7	59	87·4	2	...	9	0	4·012	2	...	„
26	8	35	272·7	3	...	9	41	4·897	2	...	„
Oct. 1	8	19	109·8	3	...	9	17	3·330	2	...	„
3	7	17	116·4	2	...	8	23	2·602	2	...	„
13	7	38	270·5	3	...	8	14	4·100	2	...	„
14	7	34	93·9	2	...	8	6	4·212	2	...	„
15	7	30	277·4	2	...	7	54	4·257	2	...	„
17	7	18	283·8	4	...	8	15	3·860	3	...	H
20	6	38	114·3	4	...	7	6	3·019	3	...	H
22	6	49	134·2	3	1	...		...	...	...	H
23	6	46	330·9	5	...	6	56	1·446	3	...	H

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Dione.

1874.	Wash. M.T. h m	Pos. Ang. °	No.	Wt.	Wash. M.T. h m	Pos. Ang. °	No.	Wt.	Obser.
Aug. 29	10 3	107·0	3	...	10 42	5·024	2	...	N
31	9 35	56·8	3	...	10 14	2·779	2	...	,,
Sept. 2	9 8	280·1	3	...	9 41	5·697	2	...	,,
3	8 30	82·2	2	...	9 0	4·590	2	...	,,
22	8 39	38·0	3	...	9 15	3·350	2	...	,,
23	8 6	135·5	3	...	8 40	2·488	2	...	,,
24	8 57	284·7	3	...	9 32	5·040	2	...	,,
25	8 3	87·4	2	...	9 4	5·164	2	...	,,
26	8 20	226·1	3	...	9 21	3·060	2	...	,,
Oct. 1	8 13	112·6	3	...	9 10	4·093	2	...	,,
3	7 12	66·0	2	...	8 17	3·436	2	...	,,
13	7 39	276·0	3	...	...	...	...	...	H
...	...	...	...	...	8 19	5·462	2	...	N
14	7 31	74·1	2	...	8 0	3·659	2	...	N
15	7 34	156·1	2	...	8 0	1·891	2	...	,,
17	7 8	90·0	4	...	7 47	5·255	3	...	H
20	6 45	101·1	3	...	7 26	5·269	4	...	H
22	6 38	19·7	5	1	...	...	...	...	H
23	7 21	117·8	3	4	...	...	...	...	H
...	...	...	...	...	7 43	3·612	2	...	N
				Rhea.					
Aug. 29	9 45	287·6	3	...	10 19	6·705	2	...	N
31	9 22	99·96	3	...	9 59	7·852	2	...	,,
Sept. 2	9 4	273·36	3	...	9 34	8·039	2	...	,,
3	8 36	312·73	2	...	9 9	3·736	2	...	,,
22	8 48	83·3	3	...	9 23	6·562	2	...	,,
23	8 12	112·1	3	...	8 48	6·090	2	...	,,
24	9 9	251·5	3	...	9 52	4·987	2	...	,,
25	7 51	282·8	3	...	8 48	7·390	2	...	,,
26	8 15	34·7	3	...	9 16	2·953	2	...	,,
Oct. 1	8 7	80·8	3	...	9 2	6·212	2	...	,,
3	7 9	241·6	2	...	8 10	4·300	2	...	,,
13	7 42	280·8	3	...	8 25	7·411	2	...	,,
14	7 27	11·4	3	...	7 54	2·424	2	...	,,
15	7 37	94·4	2	...	8 15	7·578	2	...	,,
17	7 25	267·1	2	...	...	...	...	...	H
20	6 52	106·8	3	...	7 44	6·233	3	...	H

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1874.	Wash. M.T. h m	Pos. Ang. °	No.	Wt.	Wash. M.T. h m	Pos. Ang. °	No.	Wt.	Obser.
Oct. 22	6 57	278·7	3	4	...	...	...	...	H
23	6 38	354·4	3	...	7 11	2·342	3	...	H
				Titan.					
Aug. 29	10 9	185·4	3	...	10 51	5·966	2	...	N
31	9 15	238·80	3	...	9 46	13·650	3	...	"
Sept. 1	9 24	268·96	3	...	9 35	17·193	2	...	"
2	8 55	276·30	3	...	9 26	18·414	2	...	"
3	8 24	284·06	3	...	8 48	17·009	2	...	"
22	9 1	25·8	3	...	9 37	5·945	2	...	"
23	8 24	67·1	3	...	9 11	10·218	3	...	"
24	9 25	83·3	3	...	10 13	15·050	3	...	"
25	8 22	91·7	3	...	8 39	17·829	3	...	"
26	8 29	98·7	3	...	9 32	18·494	3	...	"
Oct. 1	8 0	240·6	3	...	8 54	9·113	2	...	"
2	8 1	259·5	2	...	8 20	13·556	3	...	"
3	7 3	269·5	3	...	7 45	16·720	3	...	"
13	7 51	107·3	3	...	8 32	16·254	2	...	"
14	7 44	116·9	3	...	8 13	12·560	3	...	"
15	7 41	138·0	3	...	8 7	7·985	3	...	"
17	7 31	241·5	3	...	...	...	...	...	H
19	8 37	270·53	3	...	8 44	16·414	3	...	N
20	8 37	277·96	3	...	8 25	14·638	5	...	"
23	7 27	323·72	3	...	...	...	...	...	H
...	...	...	...	...	7 50	10·436	3	...	N
27	7 35	92·22	3	...	7 42	17·031	6	...	"
				Hyperion.					
July 14	13 12	132·2	2	...	13 2	9·940	1	...	N
The date is possibly July 13.									
Oct. 2	8 32	93·7	3	...	8 36	23·788	3	...	"
3	7 28	98·0	2	...	8 5	23·339	1	...	"
				Iapetus.					
Sept. 26	8 9	54·1	3	3	8 53	7·897	3	3	N
Oct. 1	7 48	84·0	2	...	8 42	26·424	2	...	"
2	7 56	85·2	2	...	8 7	29·961	4	...	"
3	7 38	86·5	3	...	7 56	33·135	5	...	"

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	Wash. M.T.	Pos. Ang.	No.	Wt.	Wash. M.T.	Pos. Ang.	No.	Wt.	Obser.
1874.	h m	°			h m	°			
Oct. 13	8 3	92·88	2	...	...	...	...	...	N
14	8 40	93·28	2	...	8 30	50·326	5	...	,,
15	8 31	93·84	2	...	8 52	50·137	6	...	,,
19	8 30	95·84	2	...	8 15	45·536	5	...	,,
20	8 6	96·32	2	...	8 2	43·602	5	...	,,
23	8 3	98·37	2	...	8 16	36·387	5	...	,,
27	7 16	103·31	4	...	7 28	24·168	5	...	,,

On an Investigation of Bessel's on the Refraction through an Atmosphere. By E. Neison.

In the *Astronomische Nachrichten*, No. 263, is an investigation of Bessel's on the limits of a possible lunar atmosphere, in which he determines the greatest possible density any atmosphere to the Moon can possess, and his conclusions have been widely accepted and quoted, though generally without any indications of how they were obtained, or where they appeared. Having lately become aware of the complete nature of Bessel's labours, their discordance with those given in the *Monthly Notices*, vol. xxxiii. p. 10, demanded attention. On examining Bessel's investigation, it was found that he had assumed the condition of a uniform temperature, as being the most favourable to a great surface density for a given horizontal refraction, whereas it is the most unfavourable; whilst it appeared certain he had, in quoting an equation from Laplace (*Méc. Cél.* iv. p. 252) employed one constituent without modifying it in the manner necessary when applied as he proceeded to do. As the uncertainty arising from such discrepancies is very inconvenient, an independent derivation of the true result has been made, omitting the constituent in question.

Assume

a = radius of Moon (or planet);

$g, \quad \delta, \quad p, \quad t, \quad \mu$ = force of gravity, density, pressure, temperature, and index of refraction, at a height x above the surface;

$g_0, \delta_0, p_0, t_0, \mu_0$ = the same, at the surface.

Then the equation

$$dp = -g . \delta . d x,$$

changing the variable to u, where $u = \frac{1}{a+x}$ and $d x = -\frac{du}{u^2}$, and putting for g its equivalent $a^2 \, u^2 \, g_0$, becomes